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Performance Oriented Packaging Testing of Container, Shipping and Storage, Mk 684 Mod 0, Mk 460 Mods 0, 2, 3, 4, Mk 510 Mod 0, and Mk 683 Mod 0 for Packing Group II Solid Hazardous Materials

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This Performance Oriented Packaging (POP) test was conducted to ascertain whether the Mk 684 Mod 0 Shipping and Storage Container meets the Packing Group II requirements specified by the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 31 December 1991. The packaged commodity used for the test was one inert Mk 45 Mod 9 Mass Mock Up weighing 49 kg (107 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in commodity and/or packaging, 6 kg (13 pounds) were added. Gross weight of the loaded container was 67 kg (147 pounds). The test results indicate that the container has conformed to the POP requirements.

In addition, due to their similarities in design, size, and weight, this test is considered representative of qualification testing for the Mk 460 Mods 0, 2, 3, 4, Mk 510 Mod 0, and Mk 683 Mod 0 Shipping and Storage Containers as per the variation in Title 49 CFR 107, Sec. 178.601h.

14. SUBJECT TERMS

POP Test of Mk 684 Mod 0, Mk 460 Mods 0, 2, 3, 4, Mk 510 Mod 0, and Mk 683 Mod 0 Shipping and Storage Containers

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PERFORMANCE ORIENTED PACKAGING TESTING OF CONTAINERS, SHIPPING AND STORAGE, MK 684 MOD 0, MK 460 MODS 0, 2, 3, 4, MK 510 MOD 0, AND MK 683 MOD 0 FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

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Naval Sea Systems Command
(Code PMS-422)
Washington, DC 20362-5101

INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the Mk 684 Mod 0 Shipping and Storage Container meets the Packing Group II requirements specified by the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 31 December 1991. The packaged commodity used for the test was one inert mock up of a Mk 45 Mod 9 Target Detecting Device (TDD) weighing 49 kg (107 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in commodity and/or packaging, 6 kg (13 pounds) were added. Gross weight of the loaded container was 67 kg (147 pounds).

Due to unavailability only one container was used for testing. This is less than the number required by the regulations. Approval for this deviation has been granted by the Under Secretary of Defense, Memorandum for the Joint Logistics Commanders dated 22 February 1990.

In addition, due to their similarities in design, size and weight, this test is considered representative of qualification testing for the Mk 460 Mods 0, 2, 3, 4, Mk 510 Mod 0, and Mk 683 Mod 0 Shipping and Storage Containers as per the variation in Title 49 CFR 107, Sec. 178.601h.

TESTS PERFORMED

1. Base Level Vibration Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. The container was placed on a repetitive shock platform which has a vertical linear motion of 1-inch double amplitude. Movement of the container was restricted during vibration in all but the vertical direction. The frequency of the platform was increased until the container left the platform 1/16 of an inch at some instant during each cycle. Test time was 1 hour.

2. Stacking Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. The container was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a minimum height of 3 meters (including the test container). A weight of 333 kg (735 pounds) was stacked on the test container. The test was performed for 24 hours. The weight was then removed and the container examined.

3. Drop Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. Five drops were performed from a height of 1.2 meters (4 feet), impacting the following surfaces:

a. Flat bottom.

b. Flat top.

c. Flat on long side.

d. Flat on short side.

e. One corner.

PASS/FAIL

1. Base Level Vibration Test

The criteria for passing the base level vibration test is outlined in Title 49 CFR, Sec. 178.608(c): No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

2. Stacking Test

The criteria for passing the stacking test is outlined in Title 49 CFR, Sec. 178.606(d): No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation.

3. Drop Test

The criteria for passing the drop test is outlined in Title 49 CFR, Sec. 178.603(f): A package is considered to successfully pass the drop tests if for each sample tested, no rupture occurs which would permit spillage of loose explosive substances or articles from the outer packaging.

TEST RESULTS

1. Base Level Vibration Test

Satisfactory.

2. Stacking Test

Satisfactory.

3. Drop Test

Satisfactory.

DISCUSSION

1. Base Level Vibration Test

The input vibration frequency was 3.5 Hz. Immediately after the vibration test was completed, the container was removed from the platform, turned on its side and inspected. No unfavorable distortion or deterioration was observed.

2. Stacking Test

The container was inspected after the 24-hour period was over. No unfavorable distortion or deterioration was observed.

3. Drop Test

After each drop, the container was inspected. The inert Mk 45 Mod 9 Mass Mock Up was completely retained by the container.

REFERENCE MATERIAL

A. Code of Federal Regulations, Title 49 CFR, Parts 107-178.

B. Bureau of Explosives Tariff No. BOE 6000K Hazardous Materials Regulations of the Department of Transportation by Air, Rail, Highway, Water including Specifications for Shipping Containers.

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TEST DATA SHEET

POP MARKING: UN 4H1/Y67/S/**/USA/DOD/NAD **YEAR LAST PACKED OR MANUFACTURED	
Container: Mk 684 Mod 0 Shipping and Storage Container	
Type: 4H1	**Container P/N or NSN:** P/N 5167081
Drawing Number: 5167081	**Outer Packaging Material:** Polystyrene Foam
Dimensions: 41" L x 24" W x 24" H	**Gross Weight:** 67 kg (147 pounds)
Closure (Method/Type): Tape, 1-1/2 inch, Type IV	**Tare Weight:** 12 kg (27 pounds)
Additional Description:	

PACKAGED COMMODITY:		
Name: See table 1		**NSN(s):** See table 1
United Nations Number: See table 1		
United Nations Packing Group: II		
Physical State (Solid, Liquid, or Gas): Solid		
Vapor Pressure (Liquids Only): N/A	**At 50 °C:** N/A	**At 55 °C:** N/A
Consistency/Viscosity: N/A		**Density/Specific Gravity:** N/A
Amount Per Container: See table 1		**Flash Point:** N/A
Net Weight: See table 1		

PACKAGED COMMODITY USED FOR TEST:	
Name: Mk 45 Mod 9 TDD Mock Up	**Physical State:** Solid
Consistency: N/A	**Density/Specific Gravity:** N/A
Test Pressure (Liquids Only): N/A	**Net Weight:** 55 kg (120 pounds)
Additional Description: The net weight includes the current maximum commodity weight plus an additional 6 kg (13 pounds).	

N/A = Not Applicable

TABLE 1
Commodities Approved for Shipping in the Mk 684 Mod 0 and Mk 460 Mod 4 Shipping and Storage Containers

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
2W96	8T 1420-01-242-8797	SCU(MR)	2643923	1.4S	0349	1	66	93
DW80	8T 1420-01-024-5332	SCU(ER)	2642909	N/A	0349	1	107	134
ZW32	8T 1420-00-411-8834	SCU(ER)	2642909	1.4S	0349	1	107	134
1W83	8T 1420-01-242-8795	SCU(MR)	2643923	1.4S	0349	1	66	93
YW85	8T 1420-01-135-6854	SCU(MR)	2643923	1.4S	0349	1	66	93
SW41	8T 1420-01-056-2677	SCU(ER)	1642909	1.4S	0349	1	107	134
6W45	8T 1420-01-056-2677	SCU(ER)	2642909	1.4S	0349	1	107	134

Mk 510 Mod 0 Shipping and Storage Container

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
2W96	8T 1420-01-242-8797	SCU(MR)	2643923	1.4S	0349	1	66	93
1W83	8T 1420-01-242-8795	SCU(MR)	2643923	1.4S	0349	1	66	93
YW85	8T 1420-01-135-6854	SCU(MR)	2643923	1.4S	0349	1	66	93

Mk 683 Mod 0 Shipping and Storage Container

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
YW84	8T 1420-01-135-3605	APBU	5167082	1.4S	0349	1	66	93
7W60	8T 1420-01-172-7780	APBU	5167082	1.4S	0349	1	66	93
2W98	8T 1420-01-241-9427	APBU	5167082	1.4S	0349	1	66	93
ZW25	8T 1420-00-406-7645	APBU	5167082	1.4S	0349	1	66	93
SW73	8T 1420-01-061-5993	APBU	5167082	1.4S	0432	1	66	93
WW84	8T 1420-01-102-1084	APBU	5167082	1.4S	0349	1	66	93
SW25	8T 1420-01-316-1819	APBU	5167082	N/A	N/A	1	66	93

Mk 460 Mod 0 Shipping and Storage Container

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
DW80	8T 1420-01-024-5332	SCU(ER)	2642909	1.4S	0349	1	107	134
ZW32	8T 1420-00-411-8834	SCU(ER)	2642909	1.4S	0349	1	107	134
SW41	8T 1420-01-056-2677	SCU(ER)	2642909	1.4S	0349	1	107	134
6W45	8T 1420-01-144-3389	SCU(ER)	2642909	1.4S	0349	1	107	134

Mk 460 Mod 2 Shipping and Storage Container

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
YW84	8T 1420-01-135-3605	APBU	2642928	1.4S	0349	1	66	93
7W60	8T 1420-01-172-7780	APBU	2642928	1.4S	0349	1	66	93
2W98	8T 1420-01-241-9427	APBU	2642928	1.4S	0349	1	66	93
ZW25	8T 1420-00-406-7645	APBU	2642928	1.4S	0349	1	66	93
SW73	8T 1420-01-061-5993	APBU	2642928	1.4S	0432	1	66	93
WW84	8T 1420-01-102-1084	APBU	2642928	1.4S	0349	1	66	93
SW25	8T 1420-01-316-1819	APBU	2642928	N/A	N/A	1	66	93

Mk 460 Mod 3 Shipping and Storage Container

NALC/ DODIC	NSN	Commodity Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
WW89	8T 1420-01-104-2897	APBU	2642926	1.4S	0349	1	62	89
2W97	8T 1420-01-241-9426	APBU	2642926	1.4S	0349	1	62	89
5W58	8T 1420-01-279-9961	APBU	2642926	1.4S	0349	1	62	89
SW78	8T 1420-00-062-0700	APBU	2642926	1.4S	0349	1	62	89

NOTE: Mk 460 Mod 4 and Mk 684 Mod 0 only used to ship inerts at this time.

APBU = Autopilot Battery Unit
N/A = Not Assigned
SCU(MR) = Section Control Unit (Medium Range)
SCU(ER) = Section Control Unit (Extended Range)